FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.

Jan. 26 .... **Lecture, "Some Practical Points in Fuselage Construction," by Colin Daniel, before Students' Section, R.Ae.S.**

Feb. 2 .... **Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.**

Feb. 7 & 8 **Second Air Conference at Guildhall**

Feb. 16 .... **Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.**

Feb. 23 .... **Lecture "Some possible Improvements in Aero Engine Installation," by G. R. Irvine, before Students' Section R.Ae.S.**

Mar. 2. .... **Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.**

Mar. 26–April 2 **Nice Meeting**

Mar. 30 .... **Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.**

July 6–20 **French Gliding Competition**

Aug. 6 .... **Gordon-Bennett Balloon Race, Geneva**

Sept. .... **Tyrrhenian Cup, Italy**

Sept. .... **Italian Grand Prix**

EDITORIAL COMMENT

FROM a brief article the other day in the *Evening Standard*, following the reported Washington resolution for barring the use of poisonous gases in warfare, Sir William Robertson's views would appear to regard such pious resolves as merely sops to placate the idealists who still believe in the possibility of bringing into being a real League of Nations which can for all time abolish war. When human nature has been completely revolutionised—a few thousand million years hence—such a much-wished-for bond of perfection may materialise. In the meantime, what concerns most over-taxed crawlers upon this sphere is what may reasonably happen in the next couple of decades. Washington Conference resolutions notwithstanding, there is no use shirking the question, and therefore it is refreshing to find Sir William Robertson ignoring the likelihood of any beneficial results from these political formulæ. He just plunges straight into realities and discusses what developments of poison gases, combined with aircraft, amongst other means, as distributors thereof, really give promise of in the next little scrap which all wise folk agree we should be prepared to deal with "peacefully" when it comes our way.

Field-Marshal Sir William Robertson's Views on Poison Gas and Aircraft

Rifles, guns, and men are all very well, and without question useful in their way, but what Sir William states is "we need to realise that, with the exception of the aeroplane, the introduction of poisonous gases has worked a greater revolution in the conduct of warlike operations than has any other invention since the advent of gunpowder, and that chemical warfare has become an important arm of the fighting services. . . . Again, obstacles, both natural and artificial, have always constituted in the hands of a skilful commander one of the most useful aids both to the attack and defence. . . . There were some examples of these gas obstacles on the West Front in 1918."

The use of chemical compounds in aeroplane bombs also opens up a wide field of action. As everybody knows who went through air-raids in London, Sir William points out, the ordinary explosive

bomb rarely does serious damage. Important objectives are easily missed, and within a short time after the departure of the hostile machines everything resumes its normal course.

"But if bombs containing a really harmful chemical substance were used—even such substances as are known today—the whole life and business of the raided city might be dislocated for a week or more, and all the inhabitants be driven from their homes. Much the same remarks apply to air attacks on strategic points in rear of the field armies, such as great railway centres. During the last War these had sometimes to be kept almost constantly under attack, and it was seldom that any lasting damage was done. By the use of the right sort of poisonous gas the whole locality could be made impossible for days, thus conferring the further advantage of economy in aircraft material and men."

In conclusion Sir William, after pointing out that "prohibition" is meaningless unless steps can and are taken to enforce the edict, suggests that the only way to give effect to the pious decisions is to reduce and restrict the chemical factories to the peace-time requirements of the respective countries, plus a margin for world trading. "This is a tremendous proposition," Sir William concludes, and he says, "I shall say nothing as to its feasibility. The point I desire to make is that unless and until some control is exercised over the activities of these factories—which are simply arsenals in disguise—prohibitions, resolutions, and similar pious aspirations for abolishing chemical warfare will be not only futile but dangerous, in that they will lull the nation into a feeling of security for which there is no sufficient justification."

Cranks and others who would again "trust Germany" should take these well-thought arguments to heart.

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Second Air Conference

Elsewhere in this issue will be found particulars of the papers to be read at the Second Air Conference, which is to be held at the Guildhall on February 7 and 8 next. The list is not a long one, consisting of five papers only, but this is evidently due to the arrangement that has been decided upon of devoting the whole of the first day to the reading of papers, and the second day to discussion of them. While Civil Aviation cannot well be dealt with at all adequately in five papers, this year's arrangement has, at least, the advantage that it sets aside as much time for the discussion of the papers as it does for the reading of the papers themselves. At the first Air Conference, it may be remembered, time was sadly lacking in which to discuss the various papers, and as frequently the discussions prove at least as valuable as the lectures, it is all to the good that ample time should be devoted to them. We could have wished, however, to see the Air Conference extended over a longer period, so that the vast subject might have been dealt with more adequately than is possible in five papers, no matter how good individually.

Another respect in which we think that not all has been done that might have been done to render the Second Air Conference more valuable is that it should, we think, have been made international. Commercial aviation must, in the very nature of things, become mainly International in character, and consequently the problems connected with it should be, as far as possible, discussed Internationally. There is already an excellent precedent in the First International Air Congress, which was held in Paris concurrently with the Paris Aero Show at the Grand Palais. This Congress was open to the world, and anyone was free to send in communications under suitably classified heads. We have just received the official account of this Congress, and there can be no doubt that it has brought in a surprisingly fine collection of contributions, some on technical, some on operational, and some on financial subjects. The range is wide, and an extraordinary variety of data, facts and opinions are contained in the official volumes. This country is very well represented by contributions from many well-known men in the aircraft industry, some of which we have already published, and others of which we hope to publish shortly. The ventilation of views which such an International Congress affords cannot but be to the ultimate good of aviation in general.

Compared with the French Congress, our Air Conference cannot be expected to attain the world-wide interest which the subject merits. Nevertheless, it can scarcely fail to do a certain amount of good, having in mind the publicity which will be given to it in the Press, and which, it is to be hoped, will once more call the attention of the public to the vital importance to the nation of fostering Civil Aviation. For the moment we leave the matter at that.

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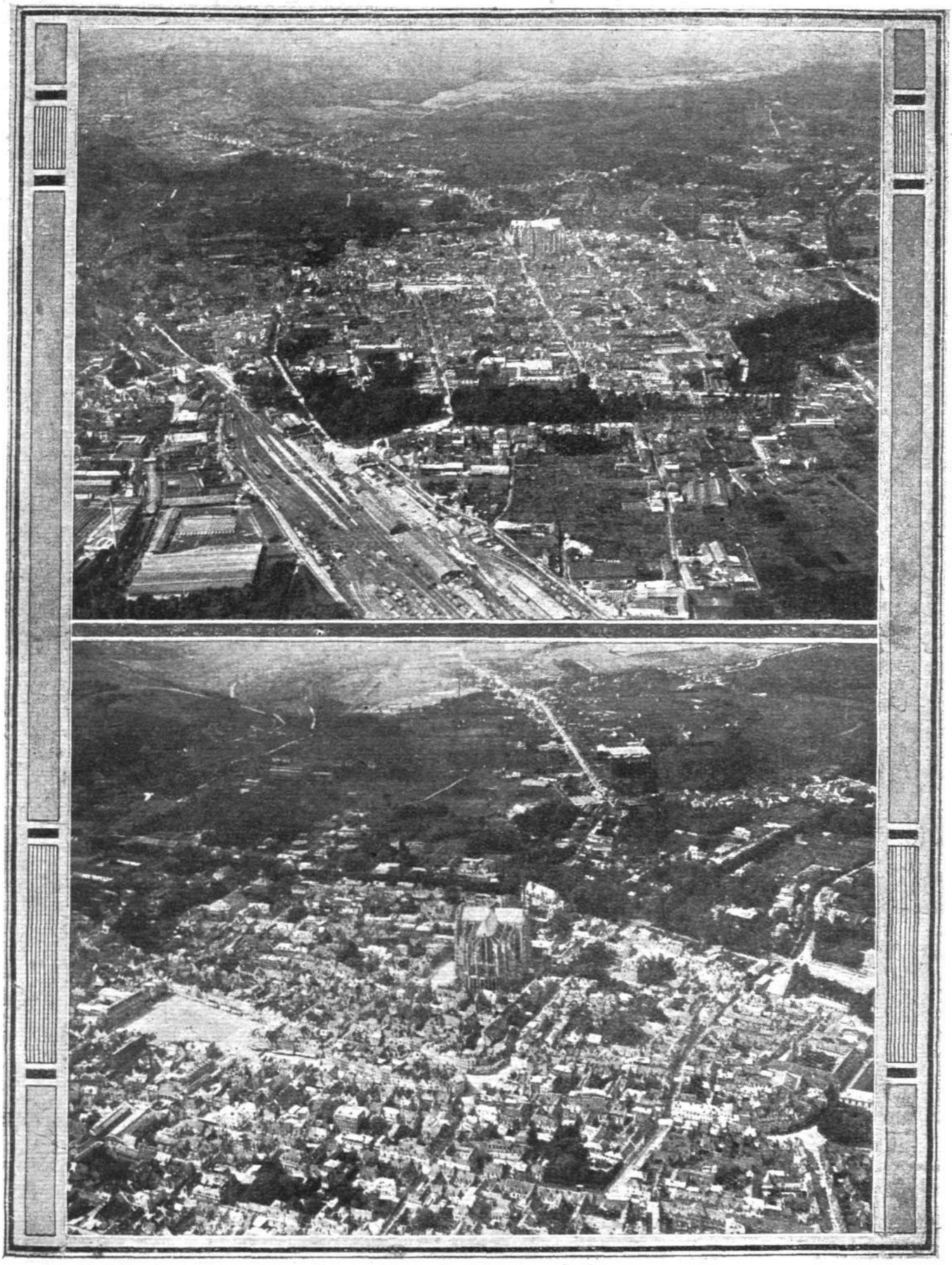
The Importance of Research

It is, we think, a very timely warning which the Royal Aeronautical Society is sounding in the communication which a deputation of the Society presented to the Secretary of State for Air. In the hurry for tests on wing sections, *fuselages*, etc., one is apt to lose sight of the far greater problems which still await solution, problems which affect fundamental principles rather than relatively slight differences in efficiency of components of aircraft. It was research which enabled the performance prediction of an aeroplane to be reduced to simple curves of speeds and climb against a base of power loading and wing loading. These curves, it is true, are approximations only, and designers who have had experience of a certain type of machine will be able to make a somewhat closer prediction. The curves are, however, of the greatest value in enabling one to make a rapid estimate of the performance of any machine, provided the power of the engine, the weight of the machine, and the area of its wing surface are known. Incidentally, not the least valuable feature of this curve is that it has been found to give equally close approximations for the smallest and for the largest machine.

To take another problem which is, perhaps, of even greater importance than that of performance—the question of stability. Already much work has been done on the determination of rotary derivatives, but the subject is one of enormous complexity. Yet we have the assurance of one of our best known aerodynamic experts that there is every reason to hope that, by close and extensive study, it will be possible to reduce stability questions to an equally simple curve or set of curves. But to attain this end a great deal of pure research work will have to be done, for which there will obviously not be the time and money if the N.P.L. and R.A.E. are starved for funds or reduced to a mere nucleus.

We have mentioned the case of stability as one



LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:
No. 24.—Two general views of Beauvais.

example only. One could continue enumerating problems which call for pure research, but the stability problem gives, perhaps, the clearest picture of the sort of research work which is in danger of being swamped by other work of a less fundamental, although more immediately promising, nature. We can heartily endorse the views expressed by the R.Ae.S. regarding the need for safeguarding research, and trust that the present need for economy, urgent though it be, will not be allowed to cause us to lose sight of the ultimate gains which knowledge attained by research alone can ensure.

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Engine Installation

Some two years of practical commercial aviation have demonstrated that about seven out of eight forced landings are due to breakdown not of the engine itself but to some part of the engine installation. This is proof, if such were needed, that the question of engine installation is one of the very greatest importance. It was therefore with considerable satisfaction that we heard the new Director of Research, Brig.-Gen. Bagnall-Wild, take this subject for his text in one of the most valuable contributions which has been made to the Royal Aeronautical Society for some time. The General realises to the full the vital necessity of paying the closest attention to the question of engine installation if that regularity and safety is to be attained upon which the success of commercial aviation will depend. A resumé of the paper is published on another page of this issue of FLIGHT, from which the main points in the lecture will emerge. We would, however, call attention here to one or two items in the paper which appear to us to call for special attention.

The Director of Research in his paper admits that he sometimes wonders whether designers really realise and fully appreciate the simplicity and other advantages of direct gravity feed from the main petrol tanks to the engine. Judging from the number of machines still flying in which one finds a superfluity of pumps, windmills, gravity tanks, piping, joints, etc., we should say that the majority of designers do not yet quite realise what a simple gravity system will do in the matter of simplification and, incidentally, weight reduction. It is true that of late there has been noticeable a tendency towards gravity feed, but still one finds new machines coming along in which this feature is not incorporated. There are very few designs in which it would not be possible, by a slight sacrifice of appearance, and possibly a certain amount of loss in aerodynamic efficiency, to employ direct gravity feed. The 18 inches of "head," which is the minimum at which the majority of carburettors will function, should be fairly easily attainable without necessitating other alterations than the placing of two petrol tanks (so as to avoid getting a tank immediately above the *fuselage*) on top of the top plane over the first pair of interplane struts of a biplane. This arrangement has been in use on a Spad-Herbemont type for a year or more with, so far as we are aware, excellent results. From the way in which this type of machine handles, it does not appear that the increase in moment of inertia due to this placing of the tanks in any way interferes with manœuvrability. Certain machines have the tanks slung under the bottom plane. This arrangement, while being as safe from fire, and offering greater facility for hand-filling of the tanks, still necessitates the use of pumps, and as bulk storage of petrol is now the accepted method, the question of filling should not be allowed to prevent the high placing of the tanks.

Intimately connected with the question of engine installation is that of easy interchangeability. Almost the only type of engine which was readily accessible and quickly changed in the earlier days of flying was the rotary, mounted on a front plate and having a second support somewhere on the fixed shaft. When the rotary type began to be supplanted, the water-cooled type was installed with but little regard to accessibility, and unfortunately this feature of the installation appears to have remained with us right up to the present time. A few attempts have been made to render the engine more accessible in the latest types of commercial machines, but with one or two exceptions we are, it is to be feared, still a long way from Gen. Bagnall-Wild's ideal of an engine which can be changed for a fresh one in about two hours. Yet there does not appear to be any very great difficulty in attaining this ideal. In fact, although we can scarcely agree with Gen. Brancker that it should be possible so to design the engine mounting that the engine could be changed in ten minutes, we think that the Director of Research was very moderate in his suggestion of a two hours, change. His ideal of being able to change the engine much as a railway locomotive is now changed is thoroughly sound, and is one which merits the very closest attention on the part of designers.

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THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JANUARY 15 AND JANUARY 22, INCLUSIVE

Route‡	No. of flights*	No. of passengers	No. of flights carrying: Mails	No. of flights carrying: Goods	No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
						h. m.		
Croydon-Paris	7	7	2	4	7	2 41	D.H. 18 G-EARO (2h. 16m.)	D.H. 18 (1), G. (2), Sp. (3), V. (1).
Paris-Croydon	9	15	3	6	5	3 33	Spad F-ACME (2h 14m.)	B. (1), D.H. 18 (2), G. (2), Sp. (4).
Totals for week ...	16	22	5	10	12			

* Not including "private" flights. † Including certain journeys when stops were made *en route*.
‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

FLIGHT
AIRCRAFT ENGINEER & AIRSHIPS

SEMI-RIGID *v.* RIGID AIRSHIPS*

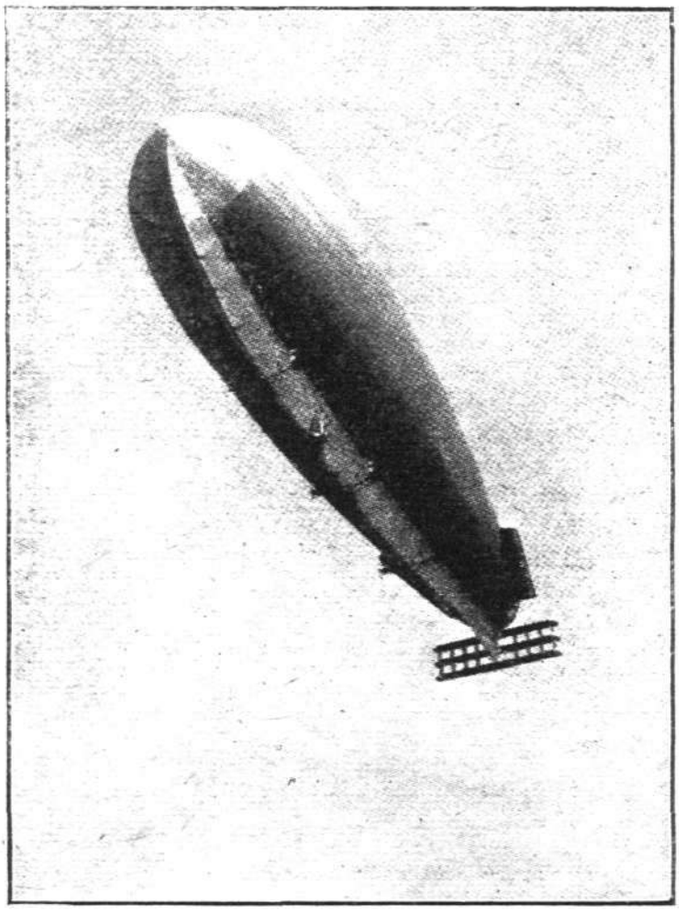
By UMBERTO NOBILE, Director of the Italian Government Airship Factory

THERE exist today two types of airships which are contending for supremacy: the semi-rigid Italian type, and the rigid German or Zeppelin type. The former may be divided into two sub-types: one having an articulated longitudinal keel or backbone, the other a rigid one.

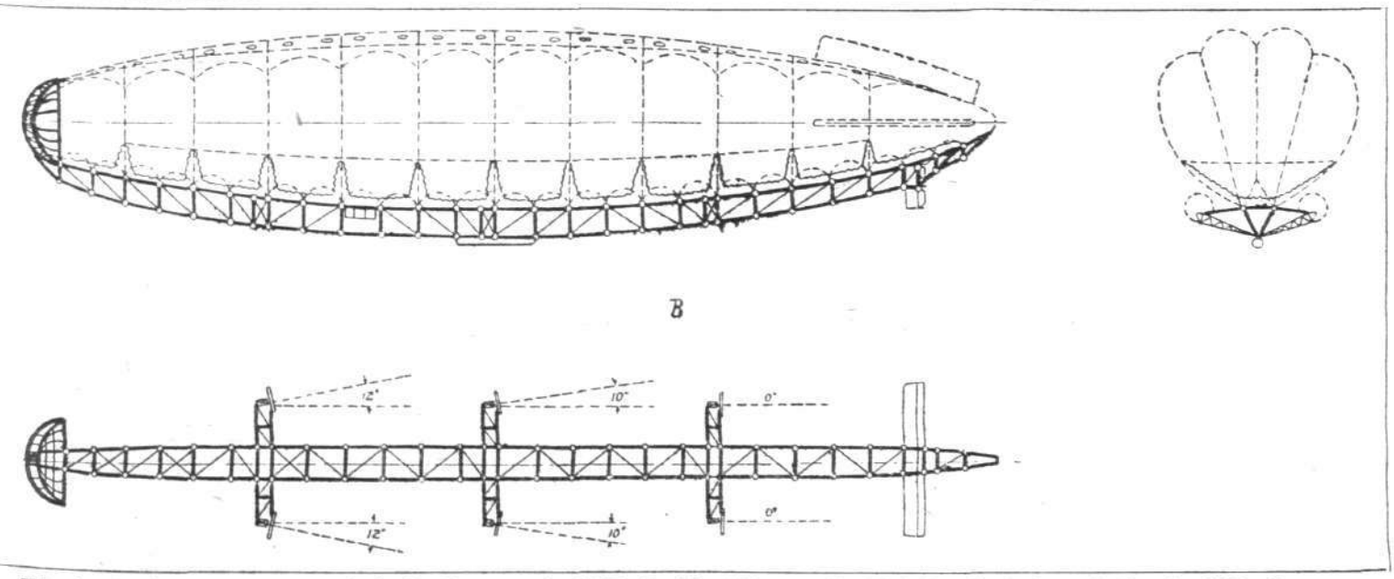
While for small volumes the superiority of the articulated keel type is generally recognised—and proved by the numerous requests from foreign Governments for trial airships of this type†—many experts maintain that, even for the larger airships, the Italian semi-rigid type can successfully compete with the rigid or Zeppelin type. Though there may be doubt concerning the articulated type, there can be none whatever as regards the rigid girder type, as shown by the brilliant success experienced with our first model "T" airship, the "Roma"—the general arrangement of which is shown in the accompanying diagrams. We are convinced that to whatever dimensions our "T" type may be increased—within practical limits—we shall always find that the particular characteristics which constitute its fundamentally good qualities are not only preserved, but even accentuated. Of course, I do not say that great increase in capacity can be made without giving rise to difficulties. When the volume exceeds 3,500,000 cubic ft., the problems of construction and assemblage take on a certain importance, but though these problems may be difficult of solution, they are never such as to lead to unfavourable conditions.

We consider that the essential reason why our type is superior to the rigid Zeppelin lies in the conception of the rigidity itself. In the latter type, the whole of the external surface is made rigid, even where the natural pressure of the gas is sufficient to preserve the shape. In the Italian semi-rigid, only those parts are made rigid which really require it, thus greatly simplifying construction and assembling, which more than compensates for the slight disadvantages of a less penetrating form. Moreover, as regards the preservation of the form, the rigid type does not appear to have much advantage over the Italian semi-rigid, since, with the rigid bow of the "T" type, the excess pressure of the gas in the envelope can be maintained relatively low, without fear of any inconvenience arising either during navigation or during mooring operations.

The superiority of the Italian conception appears, however, not merely in simpler construction, but also and more especially in greater strength. This is evident when we compare the huge, delicate arrangement formed by the metallic framework of the Zeppelins with the strong, elastic backbone formed by the longitudinal girder of the Italian type. This backbone is strong because its parts, being relatively small and exposed to great forces, have a resistance which we seek in vain in the framework of the Zeppelin. It is elastic, because its articulated joints—the peculiar characteristic of our longitudinal girder—give it an elasticity which enables the airship to withstand shocks and bumps, while the Zeppelin, as experience has proved, cannot support such shocks without serious damage.



The "Roma" (U.S. Army) Italian semi-rigid airship in flight.



The general arrangement of the Italian semi-rigid airship "Roma," which has been bought by the U.S. Government. The envelope, which resembles somewhat the Astra-Torres type in cross-section, except that it has four "lobes," is divided by diaphragms into twelve compartments, and is attached to an articulated metal backbone. Capacity, 1,200,000 cu. ft.; length, 412 ft.; max. diam., 82 ft.; disposable lift, 16 tons; six 400 h.p. Ansaldo engines, separate propellers; speed, 68 m.p.h.; range, 5,300 miles.

* From an article published in *Giornale del Genio Civile*.

† The Italian Airship Factory have just completed one "M" type airship for Great Britain, and two "O" types, one for the U.S.A., and one for the Argentine. Another "O" type is being built for Spain. This type of ship, derived from the "P" type (Crocco-Riccaldoni), may be considered as the most successful of Italian small capacity airships: it was designed by Engineers Pesce and Nobile.

In addition to these two most important advantages of the Italian type over the Zeppelin type, may be mentioned the following :—

1. Rapidity and certainty in designing.
2. Rapidity of construction and utilisation of materials of current use and constant characteristics.
3. Great rapidity and simplicity of mounting.
4. Possibility of quickly dissembling the airship for storage or transport. A Zeppelin cannot be taken apart.
5. Possibility in the future of assembling the airship out in the open. In fact, the assembling of the longitudinal keel, complete with all its accessories, comprising the stiffening of the bow, the power plant, rudders, etc., can be done without inconvenience in the open air, if protected from the weather by a temporary covering of limited dimensions. When the rigid keel is assembled, we can, given favourable weather conditions, proceed immediately with the inflation of the envelope, and to its connection to the backbone. After this, the airship may be ready in a few days, if not to fly, at least to be moored, so that the final adjustments may be made without danger.
6. Great facilities of inspection and repairing of single metallic parts. This considerable advantage arises immediately from the fact that the rigid part occupies only a small space, and also that the various parts are articulated together, so that a damaged part can easily be changed.
7. Lower cost of construction and assembling.

This advantage, however, must be set off against the cost of operation. As a matter of fact, in the Italian type, when from any cause the gas bag becomes inefficient, it must be entirely renewed. It is certain that to change one of the gas compartments of the Zeppelin is a much less costly operation, but, on the other hand, when we consider that the maintenance cost of the rigid portions is much less in the Italian type, we come to the conclusion that, on the whole, the upkeep of a Zeppelin is more costly than the upkeep of an Italian semi-rigid.

In summing-up all the advantages of an Italian semi-rigid over a Zeppelin, we must, however, admit that in one point the latter is superior, *i.e.*, in the coefficient of head resistance. But we are convinced that this inferiority will soon be eliminated by successive improvements in the Italian semi-rigid type airships.

"R.38" Disaster Inquiries

Now the Admiralty have had their say in regard to this great calamity, it should be of more than ordinary interest to receive the report on the subject of the Aeronautical Research Committee, who have been making careful investigation into the disaster and its cause.

Morocco Air Post Charges Reduced

THE Postmaster-General announces that the special air mail fee which is payable in addition to the ordinary foreign postage rate on packets posted in this country for Morocco and directed to be forwarded by the French Air Mail Service from Toulouse to Casablanca is now reduced. The new rates will be as follows :—

3*d.* up to ½ oz.; 6*d.* up to 3½ oz.; 3*d.* for each additional 3½ oz.

Postal packets by the Toulouse-Casablanca Air Mail service will also in future be subject only to the same conditions regarding maximum weight and dimensions as those forwarded all the way by the ordinary route.

Packets may be posted up to 6.30 a.m. (printed papers 6 a.m.) at the General Post Office, London, on Monday, Tuesday, Thursday and Saturday, to connect with the air mails for Morocco which leave Toulouse on Tuesday, Wednesday, Friday and Sunday respectively. The mails are due to reach Casablanca on the following day in each instance. The public, both in London and the provinces, are advised to send their postal packets by the air route on any day of the week, as in the normal course transmission will be greatly accelerated.

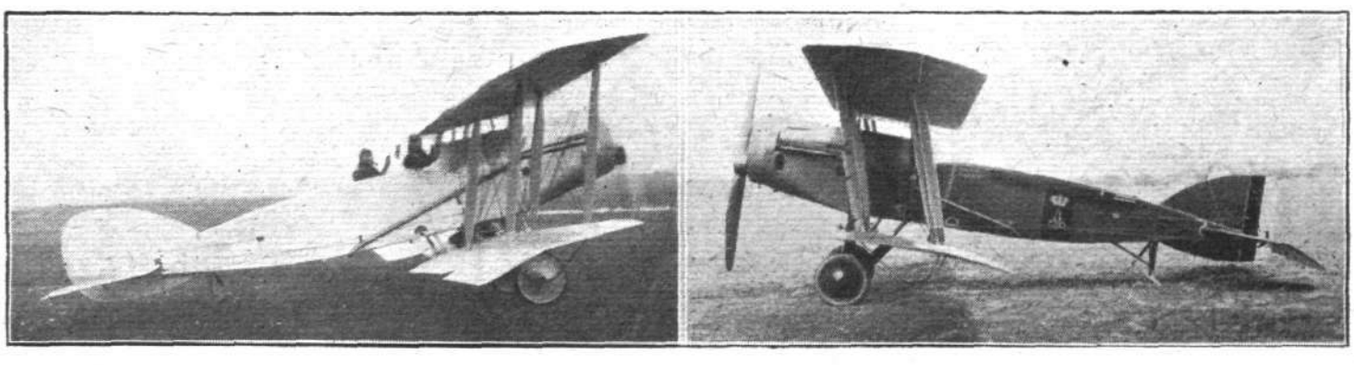
Flying the Desert

A VERY human story of flying the Desert *en route* from Cairo to Baghdad appeared recently in *The Times* from a Special Correspondent. The methods employed from start to finish are detailed and the flight over the Desert itself is well described as follows :—

"The flight from Amman onwards is across the Arabian Desert to Ramadi, a distance of about 600 miles. Except here and there, there are few physical features which would be of much assistance to a pilot in finding his way; and although it would be possible to fly on a compass course until the River Euphrates was reached, it would be very difficult to find where a machine would land on account of engine trouble. In order to overcome these difficulties, a track has been made by a number of motor lorries following each other across the desert.

"The desert is not pure sand, but sufficiently loamy to adhere when squeezed in the hand, and camel scrub and other vegetation spring up after the rains, which come between November and April. The general level varies from about 1,500 to 3,000 ft. above sea level, with considerable local undulations, watercourses, mud flats and rock outcrops, so that the car track is by no means a straight one, but winds about, choosing the easiest path. Large arrows have been made in the soil to indicate to the airman a coming change of direction. Twenty suitable areas for a landing have been marked with large circles in the course of the 600 miles. Some of these landing-grounds are of a gravelly nature and some are mud flats. The track does not get covered up, as it probably would in sand, and although it is difficult to pick up in places, it is, generally speaking, fairly easy to follow, and, so far, does not seem to be affected much by the limited amount of rain which falls in these parts.

"Due to certain misadventures, the party was three days on the journey, although the time in the air was only 10 hours, and in the summer there is no difficulty in going from Cairo to Baghdad in the day. To reach Baghdad, except by air, would entail going to Port Said, catching a steamer to Basra on the Persian Gulf, by way of Bombay and Karachi, and from there by train—a journey of about 30 hours—to Baghdad. This route would probably take a month, and this short description of the new air mail route to Baghdad is an illustration of the great saving of time in the new method of travel. An additional advantage is the feeling of freshness on landing as compared with the effects of a railway journey of similar length, an important matter to business men."



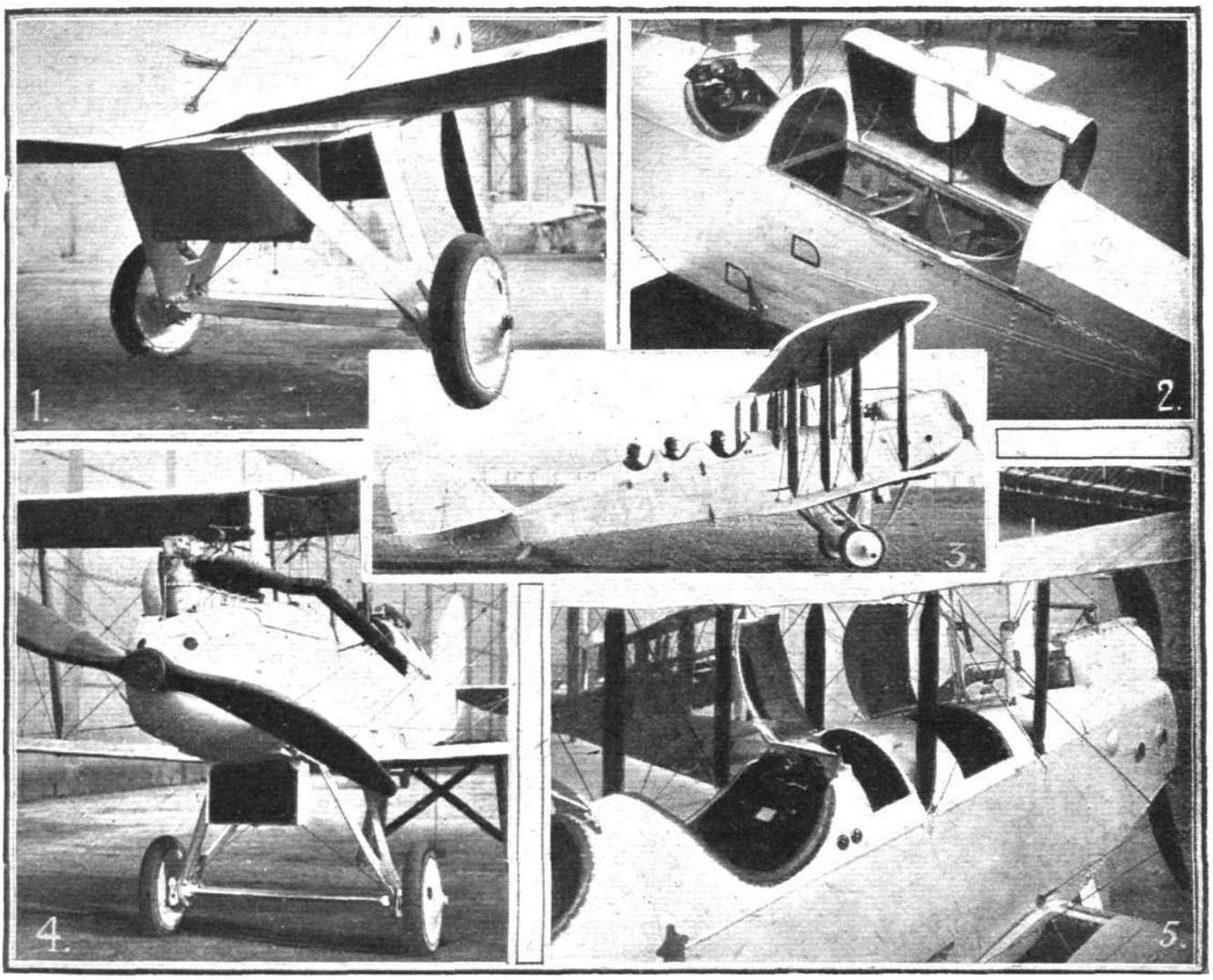
ROYAL AVIATION ENTHUSIASTS : For a considerable time the King of the Belgians has done a great deal to encourage aviation by using his aeroplane for travelling. Now the Queen of Belgium is preparing to do the same by accepting from the Aircraft Disposal Co., Ltd., a "Bristol Fighter," similar to that used so extensively by the King. Our photographs show the two machines, the one on the left being that presented to the Queen. It is finished in aluminium throughout, which makes it look very light and graceful. The machine was flown from Croydon to King Albert's private aerodrome at Brussels by Capt. Muir, and Col. Darby, General Manager of the A.D.C., made the trip as passenger in order to make formal presentation to Her Majesty.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

AN AIRCRAFT DISPOSAL CONVERSION

By some it is considered necessary only to remove the gun-ring or bomb rack, and put in a passenger's seat, to convert a military machine into a commercial one. As a matter of fact, it would seem that a considerable amount of work has to be done on such a machine before it can be really suitable for any particular form of commercial work. Such was the impression we gained, however, as the result of a visit to the Aircraft Disposal Co.'s Works at Waddon last week, for the purpose of inspecting two machines that have just been turned out for a Swiss company. The latter, which makes a special feature of aerial tours over the Alps, has already had other machines from the A.D.C., and it is owing to the successful results obtained with these that the facility and comfort. It may be mentioned in passing that the view obtained by the passengers is excellent, but we should think that flying in bumpy weather—as probably exists over the Alps—being seated so far back, may call for a certain amount of "airworthyness" on the part of the passengers.

In front of the pilot's cockpit are two freight holds, with hinged hatchways in the turtle deck, whilst under these is another compartment for passengers' luggage. This latter consists of a very neat arrangement, in which by means of a quick-release arrangement a door opens in the bottom of the *fuselage* and a large "box" slides down below the latter, permitting the luggage to be stowed away with ease.



AN AIRCRAFT DISPOSAL D.H. 9 CONVERTED FOR ALPINE TOURS: (1) The passengers' automatic luggage "lift." (2) The hinged canopy over the passengers' cockpit, giving easy access. (3) The complete (3-seater) machine. (4) The 240 h.p. Siddeley "Puma." (5) The pilot's cockpit and the two freight holds.

'planes under review were ordered specially for Alpine work.

As may be seen from the accompanying illustrations of one of these models, it consists of a modified D.H.9 having a 240 h.p. Siddeley "Puma" engine, and converted into a three-seater. Where the gun-ring used to be in the original type there is now a double cockpit for the two passengers, who are seated in tandem. The installation of this cockpit, as well as the other modifications, have been carried out exceptionally well, and with considerable attention to detail. For instance, the portion of the turtle deck around the double cockpit is hinged—as shown in the illustration—so that the passengers are able to take their places with the greatest

In place of the hinged canopy over the passengers' cockpits, a complete covering, with windows, may be fitted, converting the machine into a limousine.

Both these machines were to have been delivered by air to Debendorf, near Zurich, last week, but the exceptionally bad weather necessitated a postponement until this week. The machine illustrated, however, was taken out for a trial flight last Thursday by Mr. Muir, which we had the pleasure of witnessing. In spite of the atrociously bad weather—wind and rain *ad lib.*—the machine put up a very fine performance. The approximate speed of these 'buses at 4,000 ft. is 115 m.p.h. with full load, and the climb is said to be 10,000 ft. in 20 minutes.

Swedish Aviatrice Killed

FROM Stockholm it is reported that Sweden's only woman aviator, Miss Elsa Andersson, was killed at Askersund on January 22 while making a parachute descent from an aeroplane from a height of about 2,000 ft. No details relating to the cause of the accident are available.

AERIAL LIGHTHOUSES

1,000,000,000-c.p. Lighthouse

WE are able this week to give some brief particulars of the interesting aerial lighthouse that is being erected at Dijon in order to provide a suitable guiding light for the aerial routes between Paris and Algiers, Italy and Switzerland. This light, which is the largest and most powerful one in existence, was made by the famous French optical firm of Barbier, Bernard and Turenne of Paris, whose British representative is Major J. P. Ashley Waller of Audrey House, Ely Place, London, E.C. 1.

The range of this light in normal northern weather conditions will be about 65 miles, and in clear weather will be not less than 130, and more probably about 200 miles at a height of 6,000 ft. or thereabouts. The source of illumination is from powerful electric arcs, automatically adjusted and formed between horizontal carbons, which are surrounded by eight lenses, each composed of seven dioptric (refracting) and ten catadioptric (refracting and reflecting) parts. These lenses are so arranged that they divide into two groups of four, the axes of the two groups being opposed, and the beams from each group converge to form one large beam. This arrangement of lenses will be seen from the accompanying diagram. A special point to be noted is that the lenses are split vertically at the centre. This splitting is a patented device of the designers to enable the beam of light to take a greater speed vertically than horizontally, in order that the light may be visible outside and above the main beam. The arcs and lenses are carried on two platforms, two lenses of each group being on the top platform and the remaining pairs on the second. Below these platforms is a third, carrying a set of stand-by lamps, together with the necessary apparatus for bringing these into action and focus when required.

All three platforms are connected, and, together with all the mechanism, revolve on a vertical shaft to which they are keyed. This shaft is mounted on ball bearings and stepped in a cast-iron socket which rests on a concrete base. An electric motor with reduction gear is fitted under the lower platform and serves to revolve the whole.

Surrounding all the above is an 18-ft. diameter "house," the upper portion, opposite the lights, consisting of a double tier ventilated lantern; inner and outer galleries, with ladders, are provided for the crew. All the controls are fitted on the lower platform, whence every lamp can be inspected by means of special reflecting prisms, and its focus adjusted.

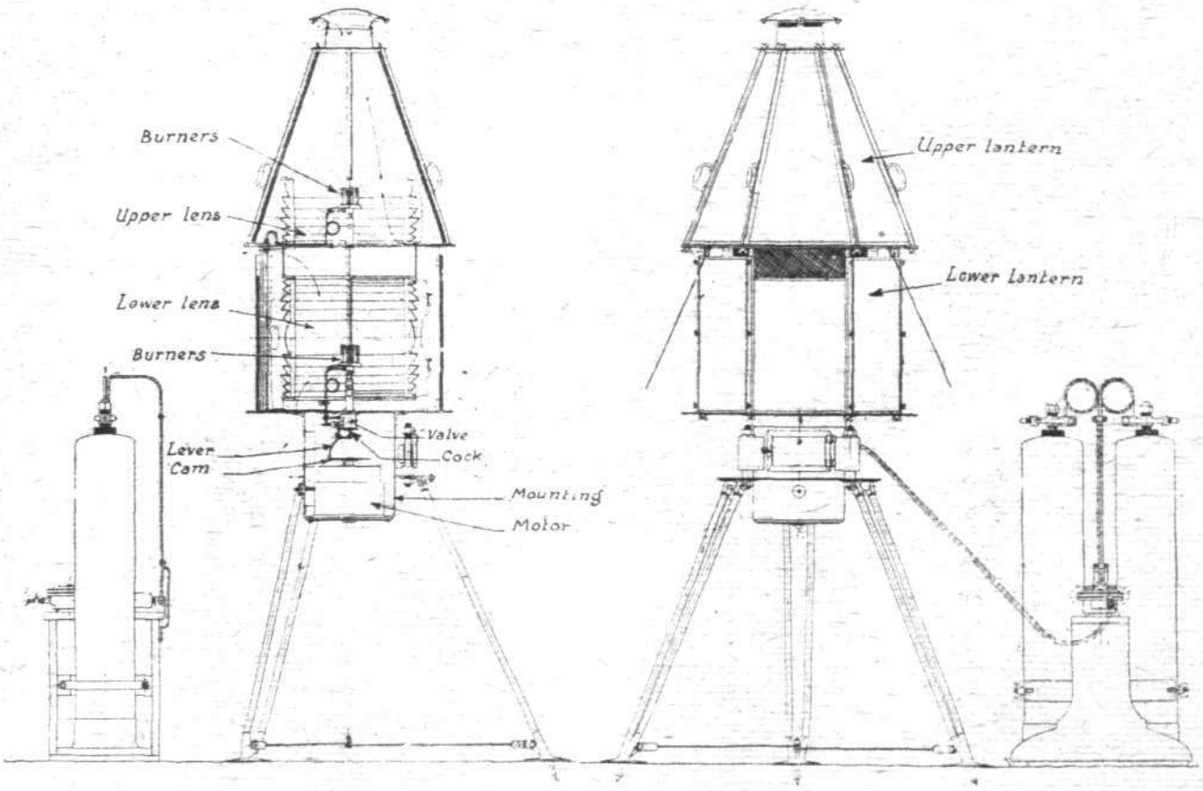
This particular light is intended for the present to give flashes at regular intervals, but, as it might be necessary to change this later on and to provide intermittent flashing of irregular periods, cams have been fitted which can be brought into play at any time to vary the length of flash and the intervals between flashes. The electric arc has been selected by the French Government for this Dijon light, as the necessary current is available in this case, but filament lamps could equally well have been fitted, with a considerable reduction in current consumption for the same intensity of light.

Powerful as this light is, we understand that the makers have full designs prepared for lights of even greater range, such as would be necessary for lighting desert routes when the number of lights employed should be kept down to a minimum. Where electric current is not available, as in the above case or Central Africa, etc., either acetylene gas or paraffin vapour would form the source of illumination, whilst automatic devices would be fitted which enable the lights to operate unattended over periods of many months.

This automatic device, which is fitted on many marine lights erected all over the world by Messrs. Barbier, Bernard and Turenne, automatically lights and extinguishes the lamp at any predetermined times, and is operated by the combined action of a clockwork motor and the flow of gas leading to the bye-pass—or an electrical device where electric light is employed.

The whole gear is extremely ingenious, but lack of space will not, at present, permit a full description here. Briefly, however, it is composed of a clockwork movement with anchor release carrying a timing-box and timing disc divided into 24 hours, the last making one revolution per day. The timing disc carries two circular slots which engage two levers suitably disposed which open and close a valve controlling the gas supply. Winding of the spring is effected by a gas motor driven by the gas leading to the bye-pass and working a ratchet driving the drum containing the spring. A gas pocket regulates the pressure and feed to the bye-pass.

Gas from the main supply enters a valve leading to the burners, thence to the gas motor. The latter consists of a box containing a membrane, which is raised by the pressure of the gas, and in so doing operates a ratchet gear, which in turn winds the spring drum—a friction slipping device being, of course, provided.

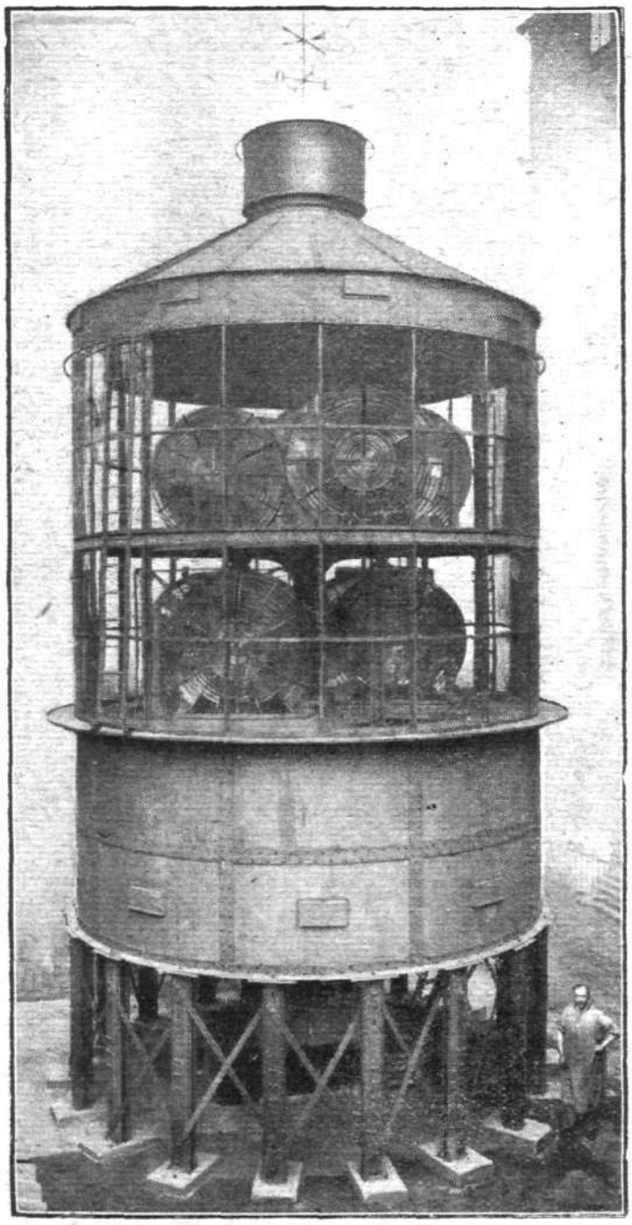


The Barbier, Bernard and Turenne Portable Flashing Aerial Beacon (4th Order).

From the motor the gas passes to the gas pocket which, through the medium of an arrangement of membranes and springs, feeds the bye-pass with a constant supply of gas. The opening and shutting of the valve is effected by the movement of adjustable keys fitted on the timing disc between the arms of the lever which controls the valve—the timing disc being, of course, driven by the clockwork motor.

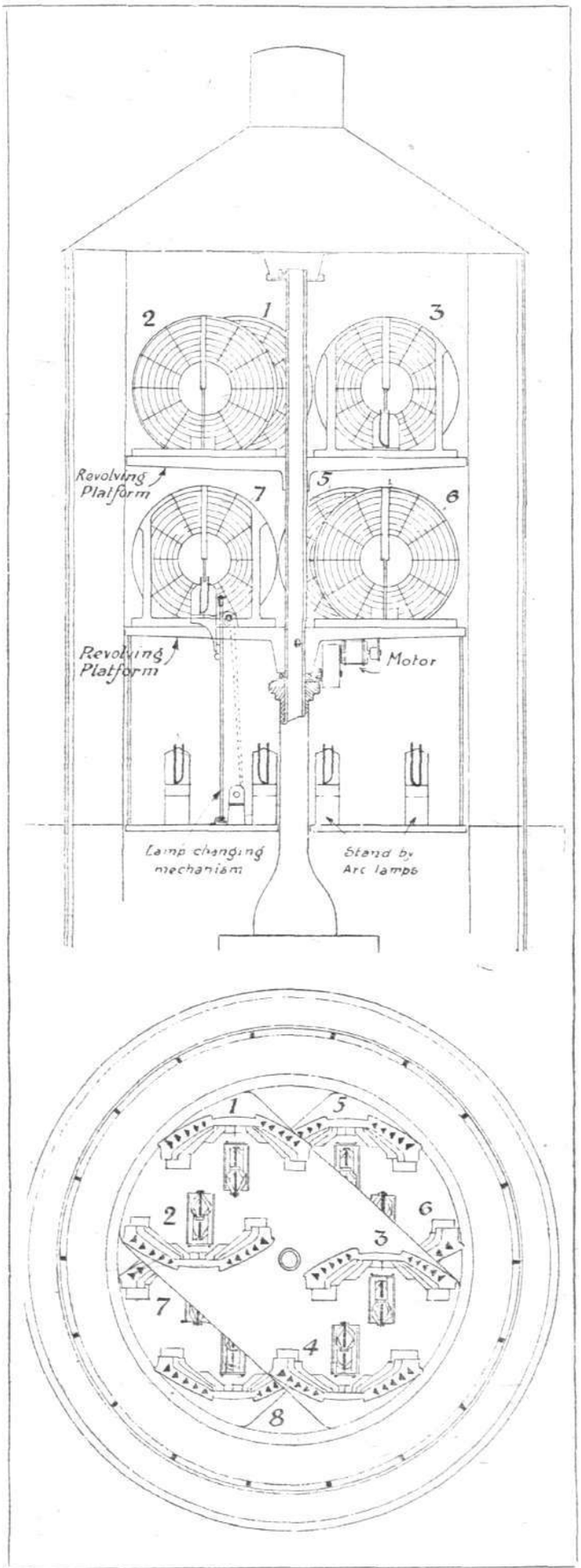
During the Great War Messrs. Barbier, Bernard and Turenne carried out a considerable amount of work in connection with aerial guiding, landing and other lights, and as a result of the experience thus gained have produced a number of standard patterns of aerial beacons, etc. Amongst these brief mention may be made of two, one a special medium-range flashing light of the fifth order, and the other a portable flashing light of the fourth order, which is shown in the accompanying illustration.

The former light has an optic composed of five annular panels, disposed in pentagon, which permits the following signals being given: (*a*) 1 flash, (*b*) 1 group of 2 flashes, (*c*) 1 group of 3 flashes, (*d*) 1 flash followed by a 2-flash group, (*e*) 1 group of 4 flashes. For these different combinations



The Barbier, Bernard and Turenne One-Thousand Million Candle-power Lighthouse. A general view of the complete lighthouse, which is being erected at Dijon, showing its huge proportions.

metal panels are employed to mask the appropriate lenses. Each annular panel is composed of three dioptric, five upper catadioptric and three lower catadioptric rings. The optic is arranged to give a beam of light whose axis, allowing for atmospheric refraction, at the limit of range crosses the 13,000 ft. altitude, and in order to give visibility right up



Elevation and plan, diagrammatic, of the Dijon light, showing the arrangement of the eight lenses and arcs into two groups, on two revolving platforms. The beams from 1 and 3 on the upper platform converge with those from 5 and 7 on the lower platform and form one large beam. In a similar way the beams from 2 and 4 (top) converge with the beams from 6 and 8 (lower) and form one beam, but opposed to the first.

to the zenith, the panels are split on their middle vertical line as previously described.

The source of light may be either electric or acetylene, or an adaption to take either at will. If electric, a 3,000-c.p. metal filament lamp is used, absorbing 15 amps. at 110 volts. For acetylene, either a 12-burner naked-flame light (300 litres/hr.) may be used or an incandescent burner. The support for the burner is adjustable for focussing, and a sight tube enables the latter to be accomplished whilst the light is burning. Rotation is effected in three different ways: (1) If electrically lit, by an electric motor coupled direct to a reduction gear, all on one base plate. (2) If lit by acetylene, by weights and gearing. (3) If for alternate lighting, the base of the light takes both electric motor and weights, a clutch system being fitted to transfer from one to the other. The optic, its base and the rotating gear are all enclosed in a lantern having a metal lower part with doors for access to the gear; the top is fitted with glass and is ventilated.

The fourth order light is especially suitable for military work, or for marking out temporary air routes. It consists of a tripod supporting a mounting in which is fitted a clockwork rotating device (or gas motor or electric motor). The upper part of this mounting also carries, on a circular plate, the valve and adjustable holder for the burners (12-burner, 30 litre/ hr. type). Covering the whole mounting is a hexagonal plate on which is fitted the lens, composed of 11 dioptric elements, enclosed by a hexagonal lantern. On the top of the latter is another hexagonal plate carrying a second and similar burner surrounded by a half-lens composed of 6 dioptric elements, all enclosed in a cone-shaped lantern.

The rotating device carries a cam which controls by a lever the cock on the valve so as to give instantaneous closing and opening, thus producing successive periods of illumination and extinction—according to the type of cam fitted—of both burners simultaneously. Two bye-passes of a special type are fitted to each burner, giving instantaneous re-lighting of the burners. The clockwork device is very strong, and is powerful enough to actuate the light all night without rewinding. A movable stand at the side of the tripod carries two or more bottles of dissolved acetylene (4,000 litres each) for supplying the burners.

As previously noted the clockwork device can be replaced by a gas motor or by an electric motor (when electrically lit). These motors carry the cam, and their installation eliminates the necessity of daily winding the clockwork. The automatic lighting and extinguishing device, previously described, may also be fitted. The total weight of this light, without the gas bottles, is about 825 lbs.

NOTICES TO AIRMEN

Great Britain and France: Aerial Corridors

THE provisional agreement relating to aerial communication between Great Britain and France (Article 12) has been amended in the following respect:—

The corridors of entry into Great Britain have been abolished. Aircraft may therefore cross the coast of Great Britain at any point, except over a prohibited area.

The corridor of entry into France from Great Britain extends from Etaples to the Belgian frontier (*vide* Notice to Airmen No. 36 of 1921).

(No. 6 of 1922.)

Belgium: Erection of Wireless Mast at Haren

1. A wireless mast, 28 metres (92 ft.) high, has been erected near the aerodrome control office on the western side of Haren aerodrome. The mast is marked by day by three red flags, and at night by three red lights.

(No. 7 of 1922.)

France: Emergency Landing Grounds, Lighthouses, Etc.

PREVIOUS Notices to Airmen relating to France have been amplified and amended in regard to emergency landing grounds at (*a*) *Berck-sur-Mer*, (*b*) *Poix*, (*c*) *St. Quentin*, (*d*) *Beauvais*.

2. *Marking of Landing Grounds.*

The following system of marking the boundaries of the landing grounds of *Berck-sur-Mer, Poix and St. Quentin* has been adopted:—

Horizontal and vertical iron plates, painted white, are mounted on posts 1 metre in height at intervals of 50 metres round the edge of the landing ground.

In order to indicate the boundary of the ground when it is covered with snow, the following additional markings are used:—At each of the principal corners of the landing ground vertical panels, painted with alternate black and white horizontal bands, are placed on posts 3 metres (9 ft. 10 ins.) in height.

Caution. The height of some of these markings necessitates care in their avoidance. Pilots are also warned that the circles and names mentioned above are constructed of concrete, and although all possible care has been taken to make them level with the surface of the aerodrome, it is inadvisable to taxi over them at any considerable speed.

3. *Aerial Lighthouses.*

4. *Customs Regulations.*

(For details application should be made to the Air Ministry for No. 8 Notice of 1922.)

Wireless Telegraphy Stations in Operation in Connection with Civil Air Routes

A NEW Notice to Airmen (No. 9 of 1922), obtainable from the Air Ministry, is substituted for No. 61 of 1921 in regard to the wireless stations operating in connection with civil air routes, which are classified as follows:—*Class "A"*—Stations directly concerned with flying operations, whose routine is primarily intended for aircraft. *Class "B"*—Stations indirectly concerned with flying operations, whose routine is not primarily intended for aircraft.

These are classified for: I, British Isles; II, Belgium; III, France; IV, Holland; V, Other countries.

This Notice cancels Notices to Airmen Nos. 61, 77 and 91 of 1921.

(No. 9 of 1922.)

Sir Ross Smith's New Adventure

IT is now some time ago that the first rumours were heard of a proposed flight around the world by Sir Ross and Sir Keith Smith. It appears that plans are now fairly advanced and that there is a possibility of the flight starting within the next three or four months. We understand that Sir Ross intends to use a Vickers "Viking" amphibian, and after hearing his lecture on the flight to Australia and seeing the films, one feels convinced that the amphibian type of machine is the right one for the purpose. It is true that the land gear weighs a good deal, but on the other hand such a machine is not so restricted to long stages between aerodromes as is the ordinary land machine. The route to be followed has not been definitely decided upon, but it will probably be the eastern one—*i.e.*, London to Cairo and Baghdad, *via* France, Italy, etc., and thence to India, China, Japan, Alaska, Canada, Newfoundland, Azores, and home. The most difficult part of the route will, of course, be the Atlantic crossing, but if the route be laid over the Azores the distances should be within the capacity of the "Viking."

Diesel Engines for Aircraft

ACCORDING to the Aviation Correspondent of the *Daily Telegraph*, there is reason to believe that the Diesel type of engine will soon be a practical proposition for use on aircraft. We wish we could share his optimism. Although the type will probably be modified to suit aircraft conditions some day, we have no great hopes of this happening in the immediate future. At the Paris Aero Show was exhibited a radial engine which was said to be designed for operation on the Diesel principle. In view of the high compressions reached, however, it appeared distinctly on the light side, and although it represents an attempt at solving the problem, we should not think that success is yet within sight.

Washington Naval Treaty and Aircraft Carriers

IT looks as if the Naval Treaty for limiting armaments arranged at the Washington Conference is now likely to go through. The Article (9) dealing with aircraft carriers now reads as follows:—

"No aircraft carrier exceeding the 27,000-ton standard shall be acquired or constructed. It is provided, however, that any of the contracting Powers may, without increasing its tonnage of aircraft carriers, build not more than two aircraft carriers each of a tonnage of not more than 33,000, and in order to effect economy any of the contracting Powers may use for this purpose any two of their ships, whether already constructed or in the course of construction, which would otherwise be scrapped under the Treaty."

FLIGHT

THE IMPORTANCE OF RESEARCH IN AERONAUTICS

THE following is an epitome of the views of the Council of the Royal Aeronautical Society on the need for better safeguards to prevent the submerging of applied scientific research in aeronautics by technical experimental work. These views were laid before the Secretary of State for Air at a recent interview by a deputation of the Council of the Royal Aeronautical Society, consisting of Lieut.-Col. M. O'Gorman, C.B. (Chairman), Prof. L. Bairstow, C.B.E., F.R.S., Sir Mackenzie Chalmers, K.C.B., C.S.I., Prof. B. Melvill Jones, A.F.C., Lieut.-Col. Alec Ogilvie, C.B.E.

The Council of the Royal Aeronautical Society asks to be allowed to put before the Air Minister in person certain views which have been borne in upon them in relation to applied scientific research in aeronautics. They would first desire to lay before the Minister the standing of the Royal Aeronautical Society and its quality to approach him on technical matters.

Four bodies represent British Aeronautical activity, and these bodies respect each other's domains and are connected by agreements and joint committees; they are:—

(*a*) The Royal Aero Club, concerned with the control of races, competitions and touring, the international sporting and touring rules and triptyques. (*b*) The Air League of the British Empire, concerned with propaganda, mainly in the interests of aerial defence. (*c*) The Royal Aeronautical Society, whose province is the spread of the study of aeronautical technics, both in theory and practice, including those branches of physics, chemistry, etc., which relate to the aeronautics—as well as scientific research and publications therewith. This Society is officially represented on the Aeronautical Research Committee of the Air Council. (*d*) The Society of British Aircraft Constructors, the organised body of British aircraft constructional firms. The technical staff of the last are, in significant numbers, members of the Royal Aeronautical Society.

Applied scientific research has in England, for one reason or another, suffered from serious and increasing disabilities since the earliest flight. These disabilities arose from many causes, but notably from the fact that, though research has forced itself into public recognition as fundamental to any technical advancement, when it comes to the detailed allocation of time and work this recognition becomes blurred by reason of other factors, technical, administrative and financial, which tend to obscure its fundamental importance and crowd it out of existence. The occasional and (we venture to suggest) incorrect usage of the term "research" as a comprehensive name for all and any experimentation in aeronautical technics has led to its use to cover matters other than the true "applied scientific research" to which it is the object of the Royal Aeronautical Society to draw the Air Minister's attention.

"Aeronautical technics" (or research so-called) embraces many subheads, thus: not only (1) applied scientific research (properly so called), whether theoretical, model or full-scale work—and referred to hereafter for brevity as "research," but also (2) *ad hoc* experimentation and calculation on specific appliances, or proposals not forming part of an organised series; (3) experimentation to develop acceptable devices into standard useful appliances; (4) the improvement of such devices in accordance with the demands arising from use and the introduction of modifications specified for service reasons; (5) tests of performances of normal purchases for service.

This list may be extended (the above subheads are intended to be illustrative and not inclusive).

In a number of cases there is no confusion between what falls under one or another of these subheads; but there are limiting cases, when a form of words intended to lay down what is and what is not applied scientific research would lead to discriminating wrongly between "research" and other subheads. The desire of the Royal Aeronautical Society is to ensure, if possible, the continued and urgent prosecution of "research" as above defined. This is the Society's main plea.

As regards *method*, the Society hopes to give point to the above request by certain suggestions for the consideration of the Air Minister.

If the question of an organisation to deal with the matter be now considered, we find that on the one hand all the heterogeneous activities above enumerated as aeronautical technics, which often have little in common except the fact that they are susceptible of being called "technical," might be ascribed, as and when they arise, to the same chiefs, the same subsection of the money vote, dealt with by the same staff and in the same establishments; or on the other hand, if one of them appeared to be of basic importance it might be specifically protected from encroachments.

These encroachments are natural, are known to occur in technical organisations having this diversity of interests, and are easily explained; none the less, they are difficult to guard against. They have been observed both in this country and abroad where for any reason *ad hoc* experimentation and applied research are in juxtaposition—which implies competition for the use of the time and services of the same staff. Thus, each *ad hoc* experiment which presents itself as desirable—and such always looks desirable or it would not be touched (for example, the verification of some particular wing shape or wing thickness, put forward by an enthusiast or maker as having exceptional merits)—appears to call for prompt attention; it seems to offer a royal road to results. The experiment would appear to be one of which the end can be foreseen and the amount of expenditure estimated; while the answer which the experiment affords will apparently be either positive or negative, but in either case useful.

In contrast, "research" (for example, the investigation of aircraft control at low speeds, of pressure distribution on wings, or of the twist and vibration of airscrew blades in flight, or the control of aircraft from the ground at night or in fog) is rarely backed by the pressure of an enthusiast who wants the advantages of his specific device, nor is it clear how long such an investigation will have to be prosecuted; still less what important side issues will have to be explored before its harvest of results can be expressed in terms of actual aircraft.

The administrative head thus finds himself confronted on the one hand (*a*) by a number of requests for research of which he cannot foresee either the exact end, the total cost or the exact resulting advantage, and (*b*) with demands for the verification of the alluring claims of some particular device; while, and in addition to the above conflicting demands for technical attention, there are (*c*) the Service demands for introducing improvements in existing, and standardisation of proposed, technical appliances and other kindred matters. The plea of the Council of the R.Ae.S. is that, particularly in a time such as the present of reduced expenditure, the position of "research" as above defined shall be *specifically* safeguarded in some manner. Throughout the War it was openly urged that *ad hoc* experiments must take precedence of research, and there is no doubt but that they did so—an attitude with which the Royal Aeronautical Society is in full harmony. Prior to the War much the same result was to be observed, for reasons which need not be entered upon at the present time. In the post-War period analogous troubles are liable to arise. The Royal Aeronautical Society urges upon the Air Minister that research is the fertiliser at the root of the tree of progress; without it the tree will not only fail to grow, it will die, and all that will then be available is the standing wood.

Suggested Scheme.—The constructive suggestion which this Society puts forward to give point and practicality to its proposal for the safeguarding of "research" in aeronautics, which is its main theme, is that a precedent found in the organisation of the Admiralty be followed in its general outline by the appointment of an individual of high scientific qualifications whose specific duty will be the safeguarding of "research," keeping it in touch with the scientific work of the country and with the problems of civil and military aircraft. Those characteristics of the office in question to which we wish to draw attention are as follows:—(1) That a grant of money be specifically allotted to research, as above defined. (2) That the individual holding this office shall have access to the Members of the Air Council. (3) That he have access to private advice, and have money specifically available to him for the purpose of paying for such advice. (4) That there be an advisory Committee external to the Air Ministry, consisting of scientific men. This Committee to have no executive powers and be solely advisory. (5) That this Committee should supervise and publish such matters relating to research as are deemed to be publishable in the public interest.

In addition to the above, the Council of the Royal Aeronautical Society trust that support will be continued to the movement for giving scientific training to selected officers of the Royal Air Force, so that highly experienced pilots shall be able to suggest and intelligently take part in research work—to which such assistance will be invaluable.

In conclusion the Royal Aeronautical Society points out that any retrenchments of administrative staff or expenditure in construction form strong reasons for safeguarding that least expensive and most fruitful form of activity—research.

ENGINE INSTALLATION

By Brigadier-General R. K. BAGNALL-WILD

APART from the question of the aero engine itself, that of its installation is, perhaps, one of the most vital to the sound and efficient development of commercial aviation. That the importance of the question is appreciated was evidenced by the good attendance to the extremely informative paper read by Brig.-Gen. Bagnall-Wild, Director of Research, before the Royal Aeronautical Society on January 19. The following *résumé* gives the main points raised by the D. of R., but we would recommend all who can possibly do so to obtain the copy of the Society's Journal, in which the paper will be published in full.

In his introductory remarks the lecturer pointed out that, compared with the development of aircraft structures and aero engines themselves, that of installation has shown little progress, and that today the installation of the engine in a machine presents a wide field for sound engineering design and improvement. He stated that statistics, taken over a considerable period, have shown that of the forced landings resulting from engine stoppage, *seven out of eight are due to some trivial breakdown in the installation.* This in itself is ample proof that there is room for improvement in engine installation and that the lecturer's first remarks are justified. The lecturer then proceeded to state, in a few general remarks, the obstacles which in the past have militated against sound installations.

In the early days, he said, the engines themselves were utterly unreliable, and there was then no incentive to provide sound installation systems. Throughout the greater part of the War it was usually found that the engines for certain types of machines were many months late in delivery, and that consequently it was often necessary to put in some other type of engine, intended probably for a totally different design of machine. A third factor was the universal lack of co-operation between the engine designer and the aeroplane designer. Each worked towards efficiency in his own design, while overlooking the fact that unless the one provided the optimum conditions for the other the efficiency of the aircraft as a whole must be reduced and the value of the work of both designers correspondingly depreciated.

As an instance of this lack of co-operation the General cited the case of air intakes for the carburettor. With one or two exceptions, he said, engines now actually in use are sent out without these parts, although the form of air intakes must necessarily have considerable effect on carburation and general efficiency. The aircraft designer puts on intakes to suit his design, often having the appearance of having been put on as an afterthought—as a necessary but unimportant evil. While this state of things may not be readily remedied in existing types of engines, the lecturer thought that there is no obvious reason why in future designs standard air intakes should not be provided by the engine-maker. The aeroplane designer would then naturally provide for that particular form of air intake, just as he now does for overall dimensions of the engine itself and its bearer feet.

The lecturer then stated that recently considerable improvement has been effected, owing chiefly to civil aviation bringing aircraft and engine designers in closer contact, and proceeded to consider what are the principal features required for the evolution of a sound installation. The desiderata he enumerated as follows :—

" (*a*) Reliability and simplicity of arrangement of petrol, water and oil systems to ensure maximum engine efficiency.

" (*b*) Every possible safeguard to be taken against fire risks.

" (*c*) A high factor of safety in the mounting of the engine itself, together with all accessories and attachments required for its working, not only as regards initial soundness, but also in the individual capacity of the component details for long service.

" (*d*) Ready accessibility of the complete engine and installation, particularly for those parts which require frequent inspection, such as carburettors, magnetos, petrol pumps, petrol and oil cocks, filters, controls, etc.

" (*e*) The arrangement of the installation to be such that an absolute minimum of disconnection and displacement is entailed in the removal of the engine. It should be possible to remove an engine for overhaul and to replace it with a serviceable unit in, say, not more than two hours. Indeed, I look forward to the attainment of something approaching the replacement of a locomotive as now effected on long-distance ' through ' train services, so that the aerial passengers or cargo can proceed almost without interruption over considerable distances.

" (*f*) Arrangements for engine starting to be of a simple and reliable character."

Having defined the objects to be sought for, the lecturer proceeded to consider each in detail, and by applying the results arrived at the fundamentals of installation. As regards petrol systems, he outlined the four distinct methods which have been applied so far. These were : gravity feed from main tanks, air-driven petrol pumps pumping direct or *via* a gravity tank from the main tanks to the engine, air pressure raised in the main tanks by air pumps, petrol being forced from the main tanks to the engine direct or *via* a gravity tank, and finally, vacuum apparatus to raise petrol from the main tank to a gravity tank and thence to the engine.

The advantages of the direct gravity feed from the main tanks are so considerable that we quote General Bagnall-Wild verbatim on this subject. " It will be agreed," he said, " that for reliability and simplicity gravity feed is the ideal, but so far the difficulties, from the aerodynamic point of view, in the situation respectively of the engine and fuel tanks to utilise gravity feed have been considered too great. I sometimes wonder if the simplicity and efficiency of gravity petrol feed have been sufficiently realised by aircraft designers, and whether a satisfactory design could not be evolved if the provision of gravity feed were made a condition of acceptance of the aircraft. Indeed, in view of the comparative unreliability and complexity of other systems, it may eventually be found necessary by civil companies to specify gravity petrol systems even at a slight expense of aerodynamical efficiency. A very deep *fuselage* with the engine placed low in the front and the petrol carried as far back as possible and at the side or the top of *fuselage* should readily lend itself to the system, since most carburettors will function at a minimum head of 18 in."

The General then outlined the drawbacks to the various systems of non-gravity fuel supplies. Air-pressure systems were abandoned for service aircraft owing to their extreme vulnerability. The earlier pump systems, with slow-running windmill-driven plunger pumps, necessitated the use of a gravity tank owing to the intermittent delivery. High-speed windmill-driven centrifugal pumps were next introduced. Regarding these the lecturer stated that, as their average speed is 3,500 r.p.m., mechanical failure is, unfortunately, still too frequent. To guard against this two pumps are usually fitted, which means adding enormously to the complexity and weight of the system, especially in multi-engined machines.

Turning his attention to the question of petrol pipe lines, the lecturer pointed out the well-known troubles which are likely to occur, such as the deterioration of rubber joints, and the liability to breakage of rigid attachments when the usual union nut and nipple form of joint is employed. He called attention to two methods of eliminating the trouble. One is the Blaisdell Petroflex tubing, which has already been described in FLIGHT, and the other is a new rigid metal joint which eliminates the use of a nipple and avoids a brazing operation. After the nuts and collars are placed on the pipe the latter is expanded by a special tool. It is necessary to anneal the pipe before expanding, and it is advisable to anneal again after the operation. It is also important that the two ends of the joint are set in correct alignment before tightening up. " So far," the lecturer said, " this type of joint has stood up very successfully during tests. One machine to which it was fitted throughout was badly crashed, but the joints remained intact and did not leak. Further tests are being conducted with promising results."

Regarding the difficulties of getting a satisfactory petrol cock, the lecturer stated that Messrs. Vickers have designed a cock with a phosphor-bronze body and plug of stainless steel, hardened and ground to a very fine surface, which in conjunction with the hardness of the plug reduces the abrasive effect when the cock is operated. A spiral spring-loaded packing gland prevents leaks and ensures smooth and easy operation. Numbers of these cocks, he stated, are in satisfactory use on service and civil machines today.

In dealing with the question of engine mounting, the lecturer stated that the engine bearers, and in fact the whole mounting, should preferably be made of metal (steel), which overcomes the difficulties arising from shrinkage and deterioration that takes place in wood, and has the further advantage of reducing fire danger. Regarding the special type of mounting designed for the Rolls-Royce " Condor " engine, the General said :—

"Messrs. Rolls-Royce have introduced into the 'Condor' engine an interesting development comprising a bush which serves as a sort of universal joint. This bush, which is first fitted to the engine bearer tubes, has a spherical portion over which the actual engine feet are bolted. A close working fit obtains between the bush and the engine foot, so that should the bearers for any reason be thrown out of alignment or distorted temporarily by landing shocks, etc., the undue stressing of the crankcase which would occur if the feet were rigidly fixed, is obviated. Another feature of the same system is that provision is made for any longitudinal expansion of the crankcase by leaving the two bushes for the rear engine feet free to slide along the bearer tube, while the two front bushes remain fixed to the bearers."

The lecturer expressed the opinion that there is an inexplicable lack of uniformity in the types of engine controls. Positive-acting rod types are the most satisfactory, especially when the details are well designed and made. Controls should all be marked clearly to indicate their purpose and direction of operation. Even then the different levers should be quite distinctive either by position or shape.

Oil systems are usually of a simple character, and the lecturer confined himself to calling attention to the importance of fixing the oil tank above the pump to guard against failure due to suction leaks.

The question of water-cooling systems is one of very great importance, and was dealt with at considerable length by the lecturer. After pointing out the difficulty of determining originally the size of radiator for any particular machine, owing to the many variables encountered, General Bagnall-Wild gave the following table, based upon numerous tests carried out. The atmospheric temperature is taken to be that of the average English summer conditions, *i.e.*, 23° C.:—

Altitude in feet.	Temp. Fall. °C.	A Atmos. Temp. (Assumed °C.).	B Boiling Point. (Approx. °C.).
0	0	23	100
2,000	3	20	98
4,000	6·4	16·6	96
6,000	9·4	13·6	94
8,000	13	10	92
10,000	16·4	6.6	89·6

Cowling is, the General stated, a much more difficult matter. With an air speed of 60 m.p.h. and the engine fully exposed, between 44 and 55 per cent. of the water-jacket heat can be dissipated by the engine itself. For efficient cooling it has been found that the exposed engine would require a rate of water circulation per 100 h.p. of 11 gallons per minute, while the cowled engine would require 22 gallons per minute. As engine water pumps cannot, of course, be designed to meet both of these conditions, a minimum of 15 gallons per minute is now specified for service aircraft.

While dealing with the question of petrol systems and tank disposition, the lecturer mentioned how these may affect the problem of fire risk. There are, however, other safeguards against fire which were indicated at some length. This important subject has been dealt with by the Fire Preventions Committee, and a summary of the recommendations made by this committee, which were recently published and endorsed by the Air Ministry, was given by the lecturer. They are now made a condition in all new service aircraft.

One very important item in the running of commercial aircraft is the accessibility of its engine for inspection and adjustment. This subject was very ably handled by the lecturer, who called attention to a number of details which affect the accessibility of an engine and the ease with which it can be "got at." He also suggested that in multi-engined machines it would be advisable if the designer gave the matter of easy removal careful consideration. It might be possible, he said, so to arrange the design that, with suitable ground equipment, the engine could be drawn along its bearers on to the ground apparatus sufficiently far to enable it to be picked up by a lifting gear. We believe that, as a matter of fact, some such system is already adopted by Vickers for use with the "Vimys" at their Weybridge works.

In conclusion, Gen. Bagnall-Wild turned his attention to the question of engine starting and ignition systems. He dealt with the various forms of starting gear now in use, and concluded by saying:—

"It is my view that in future we must concentrate on the auxiliary engine starter, with which promising results are already in sight. Briefly, the system now in use consists of a small air-cooled two-cylinder unit, one cylinder serving only as a pump and connected by a distributor valve to each of the main engine cylinders in turn. The pressure developed is sufficient within a few seconds to start up the auxiliary engine and to turn the main engine, filling the cylinders at the same time with a suitable explosive mixture, the auxiliary engine pumping cylinder being fed from the small engine carburettor."

The Discussion

The Chairman, Col. O'Gorman, then called upon Mr. Handley Page to open the discussion. This Mr. Handley Page did by first thanking Gen. Bagnall-Wild for a very solid contribution to aeronautical science by his valuable paper. Regarding the question of co-operation between engine designers and aircraft designers, he pointed out that during the War this was a matter of some difficulty, not to say impossibility. To take one example, his own firm was developing the large twin-engined machine, while Rolls-Royces were developing their engine, with which the H.P. machine was to be fitted. Yet so secret was the work of each considered that they were absolutely forbidden to communicate with Rolls-Royces at all. Even now it was a matter of some difficulty to attain the necessary co-operation. Personally he considered the engine the bugbear of aircraft design. What he would like to see, in order to render possible direct-gravity petrol feed, was an engine running with its cylinders turned downwards instead of upwards, which would bring the carburettor low down and also have other advantages. He thought that the ideal for multi-engined machines would be air-cooled engines with gravity feed.

Capt. Wilkinson said that as Mr. Handley Page had stated that he considered the engine the bugbear of the aircraft designer, he (Capt. Wilkinson) would say that he considered the aeroplane the bugbear of the engine designer. He would suggest that a great deal might be done if aircraft designers would get together and agree upon a few simple standard mountings and attachments, and thought that it should be possible to standardise, say, three different mountings for each type of engine, so as to suit all types of machines.

Gen. Sir Sefton Brancker said that first of all he would like to congratulate the Air Ministry on their choice of a new D. of R. (Gen. Bagnall-Wild), and then stated that personally he was all for the air-cooled engine. It seemed to him stupid to carry gallons of water about which was always either freezing or boiling when you did not want it to, and which meant extra complication, when already there was all around you an excellent medium for cooling in the simplest possible manner. He called attention to the fact that of the engines used in the East during the War, the one which always seemed happy and never gave any trouble due to cooling problems was the old air-cooled R.A.F. 4A. With regard to the lecturer's suggestion that it should be possible to change the engine in a very short time and so avoid transferring the cargo or passengers to another machine during a long voyage, he thought this was a most excellent idea and quite an original one, as far as he was aware. He did not see why, if designers applied themselves to the problem, it should not be possible to change an engine for a fresh one in about 10 minutes. As regards commercial machines, he would plead for simplicity and strength, even at the expense of a certain amount of weight.

Wing-Comdr. Briggs also pleaded for close co-operation between engine and aircraft designers, and said that he had found that exhaust manifolds were a source of trouble.

Maj. Heckstall-Smith thought it would be very helpful to people who, like himself, did not have ready access to such statistics, if tables of accidents and their causes were made available.

Maj. Wimperis said he would like to pay a tribute to the work done by the late Maj. Norman in experimenting with fire prevention. This work had been of an extremely hazardous nature, and no one could realise the value of the work done, and the courage and determination necessary for carrying it out. He called attention to a statement in the lecturer's paper which mentioned the placing of the petrol tank as far aft as possible. This placing would, he thought, tend to prevent the necessary minimum head of 18 in. from being maintained during a steep climb. He also stated that it had been found that in certain cases, if the hand-starter magneto was near the compass, the latter was upset.

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Retailers and Commercial Aviation

It should be helpful that the Incorporated Association of Retail Distributors are interested in the Air Conference next month. At a meeting last week the Council appointed Mr. T. Ernest Jackson, secretary, to represent the Association at the Conference, who will report upon the position of civil aviation and the transport of merchandise by air, as he may view it after the two days' sitting at the Guildhall.

LONDON TERMINAL AERODROME

Monday, January 23

PREPARATIONS for renewed activity on the "airways"—to follow the bad weather of the purely winter season—are already in evidence. The Air Ministry, one may mention, are erecting four new canvas hangars to alleviate the aerodrome's own particular "housing problem." These are being put up on the edge of the 'drome just below the public enclosure; and they will thus obviate any need to "taxy" machines right round to the other side of Plough Lane, as is done at present. This will be a great advantage when 'planes require merely to be re-fuelled and looked over before being turned round and sent back to Paris. The want of some such facility was, in fact, felt as far back as the summer of 1920. In the case of big repairs, or when machines are to be "garaged" for a day or so, they will of course continue to be "taxied" round to the main sheds.

The Instone people are now enlarging their main offices, in addition to building the new parcels' office. There are reports of big summer developments in connection with this air-line. They intend, as has been reported, to run goods' machines, and these are being built specially for this one purpose of transporting urgent merchandise. Such a step is obviously in the right direction. Hitherto only "general-purpose" machines, their main equipment being for passengers, have been seen on the "airways."

I understand that Instones' are now engaging new pilots in view of their summer campaign. There looks already like being keen competition this year for the service of pilots who are familiar with the London-Paris air route.

The Instone air-line uniforms have now received an addition in the shape of gold braid on the sleeves of the tunic, and on the shoulders of the greatcoat. These are markings to indicate the duties of the wearers, and to distinguish commodore and pilots from the purely ground staff.

A New and Improved Marconi-'plane

THE Marconi Company's new "Avro" was taken over on behalf of that company by Mr. Shaw during the week. The Surrey Flying Services, who have erected the machine, and converted it, appear to have put some good work into the job, and, as it has been done on the aerodrome, Mr. Shaw has been able to watch progress and have small modifications incorporated to suit his own convenience.

Instead of being fitted with a trailing aerial, the machine has a fixed aerial strung round it from wings to tail; while, in addition, all the plugs and leads from the magneto are covered by copper shields so as to minimise that interference from the ignition system which sometimes has a marked effect on wireless telephones in aeroplanes.

The Surrey Flying Services have nearly completed a second Avro which is, I understand, being built for a private owner whose name, when it is divulged, will be well known.

Weather has again dislocated the "airway" service. The standard of flying from the point of getting through when conditions are bad has deteriorated to a marked extent, and pilots are the first to admit it. It is probable that this state of affairs is due to a large extent to a desire to husband machines when there are not loads for them: whereas in the earlier, demonstration phase the object was not so much to get full paying loads as to prove that an aeroplane service could be run in all but the very worst of weather.

Mr. MacIntosh, who was injured in the foot when his o-400 crashed the other day in a fog near Le Bourget, was down at the aerodrome during the week. He manages to hobble about fairly well on crutches, and tells me that an "X"-ray examination showed no bones to be broken. The muscles and tendons of his leg were, however, badly wrenched, and it will be some time before he is able to fly again.

The peculiar feature of the accident in which Mr. MacIntosh was hurt was that, though the Handley Page stopped dead on landing, and lurched forward on its nose, the actual injury was caused by great lumps of frozen earth being forced up through the floor, the nose of the machine itself being practically uninjured.

An Interesting Rolls-Royce Rumour

THERE are reports on the aerodrome that Rolls-Royce have produced a very successful modification of the Eagle "8," and that it is to be known as the Eagle "9." In this modified engine the epicyclic gear has, it is said, been replaced by a simpler arrangement; and, if rumour is to be credited, tests have produced already some very satisfactory results.

There was news from Mr. Alan J. Cobham, the "air-taxi man," during the week. He is at present, it may be remembered, on a 10,000 miles' tour of Europe and Northern Africa, and it is now learned that he has flown with his passenger across the Atlas Mountains in Morocco. This is the first time a British "taxyplane" has made a tour of Morocco, and it is understood that the French authorities in that country have been much impressed by the capabilities of the D.H. 9C and its pilot.

Captain Leverton is back from a tour of continental air-stations, having visited Amsterdam, Rotterdam, Brussels, and Le Bourget. He maintains that Croydon is the best of the lot, and that we have little to learn from those on the other side of the Channel in the matter of organising an air station. The boot, in fact, seems to be on the other leg.

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THE COST OF RUNNING A FLYING BOAT SERVICE

IN the course of an address before the Metropolitan Section, Society of Automotive Engineers, New York, recently, C. F. Redden—President, Aeromarine Airways, Inc.—gave some interesting figures relating to the operating costs based on the actual operation of several converted Navy flying-boats equipped with both single and twin engines. These figures, which we give herewith, include everything but administrative overhead and advertising, and show the actual operating costs and the possible profits, operating to a capacity of four hours per day.

Cost of Operating an H.S.2 L. Six-Passenger Aeromarine Navy Flying Boat with Liberty Motor.

Forty-five weeks per year, four flying hours per day, five days per week. Valuation, $7,500; life of motor, 800 hours; life of boat, 3 years; insurance, 32 per cent.; interest, 7 per cent.; petrol consumption for Liberty motor, cruising speed, 27 galls. per hour (at 25 cents per gall.); oil consumption, cruising speed, 1½ gall. per hour (at 80 cents per gall.); pilot, $50 per week; mechanic, $35 per week. Cost per flying hour, including pilot, mechanic, fuel, maintenance, depreciation, insurance and interest, $29.98.

Income—	$	
Figuring five passengers per load at $10 per passenger	50·00	
Four flights of 10 minutes each	200·00	per hour
Four hours per day	800·00	,, day
Five days per week—20 flying hours	4,000·00	,, week
Total Income—		
Figuring five passengers per load	4,000·00	,, ,,
Total cost	599·72	

This allows liberally for administrative expense, advertising and dividends—$3,400·28.

Cost of Operating an F.5 L. 11-Passenger Aeromarine Navy Flying Cruiser with Twin Liberty Motors.

Forty-five weeks per year, four flying hours per day, five days per week. Valuation, $30,000; life of motors, 800 hours each; life of boat, 3 years; insurance, 32 per cent.; interest, 7 per cent.; petrol consumption for Liberty motor, cruising speed, 27 galls. per hour (at 25 cents per gall.); oil consumption, cruising speed, 1½ gall. per hour (at 80 cents per gall.); pilot, $75 per week; mechanic, $45; bowman, $30. Cost per flying hour, including pilot, mechanic and bowman, fuel, maintenance, depreciation, insurance and interest, $71·12.

Income (based on prevailing charges—either $40 per flying hour or $10 per 10-minute sightseeing flight)—

	$	
Figuring nine passengers per load at $10 per passenger for 10-minute flights	90·00	
Four flights of 10 minutes each	360·00	per hour
Four hours per day	1,440·00	,, day
Five days per week—20 flying hours	7,200·00	,, week
Figuring five passengers per load at $10 per passenger for 10-minute flight	50·00	
Four flights of 10 minutes each	200·00	per hour
Four hours per day	800·00	,, day
Five days per week—20 flying hours	4,000·00	,, week
Total Income—		
Figuring nine passengers per load	7,200·00	
Total cost	1,420·00	
Balance	$5,779·42	
Figuring five passengers per load	4,000·00	
Total cost	1,420·00	
Balance	$2,579·42	

These balances allow liberally for administrative expense, advertising and dividends.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, January 17, 1922

Air-Commodore O. Swann, C.B., C.B.E., is appt. Director of Personnel, Air Ministry ; Jan. 5.

General Duties Branch

Flying Offr. G. M. Bryer, A.F.C., is granted a perm. commn. in rank stated, retaining his present seny. ; Oct. 24, 1919. (*Gazette* Oct. 24, 1919, apptg. him to a short service commn. is cancelled.)

The following are granted short service commns. in ranks stated, with effect from, and with seny. of, the dates indicated :—

Flying Offrs.—J. E. R. Hyson ; Jan. 7. B. P. Jones ; Jan. 4. L. de G. Sieveking, D.S.C. ; Jan. 6.

Pilot Offr. on Probation.—L. A. L. Firmin ; Jan. 2.

Sqdrn. Ldr. F. W. Scarff, M.B.E., is placed on retd. list, and is permitted to retain rank of Maj. ; Dec. 31, 1921.

Nursing Service.

The following ladies are confirmed in their appts. as Staff Nurses, with effect from dates indicated :—Miss D. H. Rich ; Jan. 27, 1921. Miss L. E. Taylor ; June 15, 1921. Miss A. M. Cosgrove ; June 25, 1921. Mrs. L. L. Mackenzie ; July 1 ,1921. The following Staff Nurses to be Sisters (Jan. 1) :—M. E. Cunningham, M. E. Sears.

Memoranda.

Lieut. E. Maffey relinquishes his temp. commn. on ceasing to be empld., and is permitted to retain his rank ; Jan. 1. Maj. K. L. Buist, R.A.R.O., late Highland L.I., is granted rank of Lieut.-Col. R.A.F., on retirement from Army. Lieut. (actg. Capt.) F. A. Roberts is transferred to unempld. list ; Feb. 2, 1919. (*Gazettes* July 22, 1919, April 27, 1920, and May 8, 1920, are cancelled) (since relinquished).

London Gazette, January 20, 1922

General Duties Branch

Observer Offr. H. fimith, D.F.C., is removed from the R.A.F. ; Jan. 21.

Sqdn. Leader T. G. Hetherington, C.B.E., is restored to full pay from half-pay ; Jan. 6.

Memoranda

Two cadets are granted hony. commns, as Sec. Lieuts., with effect from the dates of their demobilisation.

Sec. Lieut. J. Miller relinquishes his temp. commn. on ceasing to be employed, and is permitted to retain his rank ; March 22, 1919.

Personals.

Married

Mr. JAMES KIDD, late 10th Hussars and R.A.F., of Capilla, Queensland, was married on January 10, in the Cathedral, Sydney, N.S.W., to Miss MARY MARTIN, only daughter of Mr. and Mrs. W. P. Martin, of Colleton, Chulmleigh, Devon.

Group-Capt. C. L. N. NEWALL, C.M.G., C.B.E., A.M., R.A.F., was married on January 18, at St. George's, Prince's Row, to Mrs. M. M. D. WEDDELL. Flight-Lieut. R. Addenbrooke-Prout, O.B.E., M.C., Royal Air Firce, was best man.

To be Married

An engagement is announced between LORD CARBERY, who is at present in British East Africa, and Miss ANDERSON, of The Lodge, Riverdale, Nairobi. Lord Carbery, who was born in 1892, succeeded to the title in 1898, and served in the R.N.A.S. during the War. Lord Carbery's seat is at Castle Freke, Clonakilty, Co. Cork, but he has lived a great deal in Paris.

A marriage has been arranged between Mr. R. L. BARBOUR, D.F.C., R.A.F., eldest son of Mr. and Mrs. R. L. Barbour, Cape Town, South Africa, and Edinburgh, and ANNA, the only daughter of Lieut.-Col. J. D. MACKAY, D.S.O., late of the Hampshire Regt. and Seaforth Highlanders, and Mrs. MacKay, of The Rowans, Ashvale, Surrey.

Killed

Flight-Lieut. ALBERT GROUNDES PEACE, A.F.C., No. 8 Sqdn. R.A.F., husband of Dorothy Helen Peace, of Salisbury, was killed in a collision during formation flying on January 13 at Hinaidi, Mesopotamia.

Capt. F. T. WILLIAMS, M.C., R.A.F., died in the Connaught Military Hospital, Farnborough, on January 18 from injuries received on January 10 from a crash at Farnborough. At the time Capt. Williams was flying a small B.A.T. 'plane. When over some huts adjoining the Connaught Hospital the engine appeared to stop, and the 'plane fell almost perpendicularly, crashing with the pilot through the roof of a hut. Capt. Williams was one of the best-known sportsmen in the garrison, and played cricket for Aldershot Command and for the Army.

Item

IT is with regret that we have to record the death, under somewhat tragic and pathetic circumstances, of an old Hendonian friend in Michael Geoffrey Smiles, who was killed on Wednesday, the 18th inst., by a fall from a window of his house at Edgware. Mr. Smiles, it appears, was suffering from a serious nervous breakdown, brought about by the failure of his business—which was, we believe, connected with a chocolate factory—and was, it seems, so greatly depressed in consequence that he jumped from his window in the absence of the nurse attending him.

Smiles was an exceptionally skilful and daring pilot, and during the War, as chief pilot to the London and Provincial Flying School, was responsible for turning out very many first-class pilots. As an instructor he was one of the best, for he had that rare gift of being able not only to impart his knowledge to his pupil to the best advantage, but of understanding the individuality of each pupil and winning his absolute confidence. In 1916 he put up a looping record —with the representative of FLIGHT as passenger—of 22 consecutive loops, on the L. and P. tractor biplane. To his widow, the daughter of his former partner, W. T. Warren, we offer our sincerest sympathies in her bereavement.

The Airship Officers Club

THE next Dinner of the A.O.C. will be held on Wednesday, February 8. This date has been selected to suit officers interested in the Air Conference. Rear-Admiral Murray Sueter, M.P., has consented to preside. It is hoped that as many officers as possible will be able to attend.

The airship situation is now most interesting, and it is hoped that the Imperial Airship Service will be started in the course of the present year, and that the Airship Officers Club will then be able to enroll new members both at home and abroad to fill the places of those who have dropped out.

The Annual General Meeting will take place before the dinner.

Further particulars as to time and place will be published in FLIGHT and *Morning Post* on February 1. The cost of the dinner (exclusive of wine) and subscription will be £1. Extra tickets 12*s*. 6*d*.

Applications and communications should be addressed to Major G. F. Herron (Hon. Sec.), at the Junior Naval and Military Club, Piccadilly, W.

Ex-R.N.A.S. Officers in Canada

THE third reunion of ex-R.N.A.S. officers in Canada was held at the Ritz-Carlton Hotel, Montreal, on December 10, and took the form of a banquet.

Wind-Comdr. Leckie, D.S.O., D.S.C., D.F.C., Canadian Air Force, presided, the following officers being present :—

Wing-Comdrs. J. L. Gordon, Robert Leckie, Ronald Redpath.

Sqdn.-Ldrs. Basil Hobbs, C. MacLaurin, A. B. Shearer, W. C. Power, L. S. Breadner, J. A. Glenn.

Flight-Lieuts. Geo. R. Hodgson, Fred Fraser, W. R. Kenny, Hugh Peck, York Wilks, Gordon Harrower, Frank S. McGill, A. T. Whealy, Philip Fisher, E. C. Stoneman, "Gus" Edwards, Marcil Dubuc, "Curley" Boswell, Barkley Drummond, Bainbridge Hall, Mostyn Lewis, W. A. Curtis, R. Keirstead, Allan Wilson, A. Partridge, Ross Johnson, "Bunny" Emery, Norman Scott, J. G. P. Cleland.

These first gatherings have proved such a success that it has been decided that the re-union should be held annually at a definite time and place to be fixed hereafter (the next, probably in the autumn or early winter of 1922, somewhere in Eastern Canada, possibly Montreal), and Flight-Lieut. H. Edwards, who sends us particulars of this gathering, would be glad to receive the names and addresses of any ex-R.N.A.S. officers who would care to be present should they find themselves in Canada about that time

Announcements will be sent in good time, and those interested should address Flight-Lieut. Edwards at The Air Board (H.Q. Canadian Air Force), Ottawa, Canada.

CORRESPONDENCE

[The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.]

THE "R.38" REPORT

[2051] The report of the Admiralty Committee of Enquiry on the history of the design of the "R.38" calls for comment in certain respects.

While it is true as stated by the Admiralty that all the experts who could have usefully served on any Special Committee called in to advise on the structural design of "R.38" were already serving in either the department of Airship Production, or in that of the Superintendent of Airships, it should be pointed out that the officers serving in the latter department were debarred by instructions laid down in Admiralty Memoranda from expressing opinion on any matters except those regarding the equipment, *i.e.* fittings, of the airship as they affected her fighting and flying efficiency.

They were not, in fact, in a position to express an opinion on her structural strength, as they had no access to any of the figures, or technical data, necessary for doing so. The fact that one of the officers who was in 1918 serving in the Superintendent of Airships Department expressed grave doubts as to "R.38's" strength up to embarking in her on her last flight, from mere observation of her behaviour in previous flights, shows that the formation of such a committee might have been of value. The statement that the ship contained no novel principles in design can hardly be considered quite correct, in view of the fact that a quadrilateral keel was substituted for the previously universal triangular one, that the "stirrup" wires were omitted in spite of the employment of 15 metre spaces between the frames, and that an entirely new method of transmitting the lift of the gas to the framework was embodied.

Furthermore, although it is true, as stated by the Admiralty, that the modifications made to her fins and rudders would not affect the strength of the hull, they did however have an indirect effect by increasing the forces on the hull when turning. In many quarters it has been stated that the disaster was partly due to the fact that "R.38" was designed to go to great heights (22,000 ft.). This is doubtful, considering the fact that the German "L.71," although of smaller volume than "R.38," was designed to go higher, and had actually done so.

"ENSIGN."

A SHORT COURSE IN ELEMENTARY METEOROLOGY.*

AN extremely instructive, and we should imagine very useful, work by W. H. Pick, B.Sc., under the above title has just been issued by the Air Ministry (Meteorological Office). As pointed out in the preface by G. C. Simpson (Director, Meteorological Office), this book is remarkable in that it is the first elementary textbook on meteorology to be written by a British teacher of this subject. This no doubt explains the remarkable lucidity with which the author has treated his subject, for only one possessing that rare gift, the power of imparting his knowledge to others, could have presented the *alpha* and *omega* of such a technical matter as meteorology so efficiently within 118 pages.

With most of the "elementary" textbooks on meteorology we have seen, it must be admitted that before we were halfway through them we either started "skipping" or quitted altogether with the excuse that life is not long enough to tackle such an intricate subject. With this book, however, we were able to read from cover to cover, and, what is more, understand what we read, and obtained an appreciable amount of knowledge of this most fascinating science.

The book is divided into three parts: Part I, General Meteorology, dealing with winds, trade winds, monsoons, etc., temperature, water-vapour in the atmosphere, fog and mist (a very interesting chapter), clouds and weather. Part II, Synoptic Meteorology: dealing with pressure and its measurement, the making of synoptic charts and some lessons derived from them, types of pressure distribution, special phenomena, forecasting and weather-lore. Part III, The Upper Air: the variation of wind with altitude, the troposphere and stratosphere, pressure, density and humidity in the upper air, etc. etc.

* Published by H.M. Stationery Office, Imperial House, Kingsway, London. Price 1/6 net.

The London Aero-Models Association

THE report of the annual general meeting will be published next week. A valuable Cup has been presented by Mr. F. Kelly to the Association, to be competed for by compressed air driven machines. Mr. F. J. Camm is giving a lecture on January 26 at 7.30 p.m., taking for his subject "Model Aeronautical Research."

February 2, General Purposes Committee Meeting will be held. Meetings held every Thursday at 7.30 p.m. at 20, Great Windmill Street, Piccadilly, W. 1. Hon. Sec., Mr. A. E. Jones, 48, Narcissus Road, West Hampstead, London, N.W. 6.

PUBLICATIONS RECEIVED

Willing's Press Guide, 1922. James Willing, Ltd., 30, King Street, Covent Garden, London, W.C. 2. Price 2s. 6d. net.

"*Germ Process*" *Motoils*. Henry Wells Oil Co., 11, Haymarket, S.W. 1.

Scientific Papers of the U.S. Bureau of Standards. No. 423 *Operation of the Modulator Tube in Radio Telephone Sets*. By E. S. Purington. Washington. U.S. Government Printing Office. Price, 10 cents.

First Aid X-Ray of the Arteries. By H. C. Orrin. London: Baillière, Tindall and Cox, 8, Henrietta Street, W.C. 2. Price 2s. 6d. net.

Technical Note No. 79. *Effect of Aerofoil Aspect Ratio on the Slope of the Lift Curve*. By Walter S. Diehl. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published January 12, 1922

26,877. LORD INVERNAIRN (formerly SIR WM. BEARDMORE) and A. GALBRAITH. Flying-machines. (172,749.)

28,011. F. SMAL and C. TURQUOIS. Carburettor control for aircraft engines. (154,179.)

30,030. B. A. DUNCAN. Metal struts. (172,826.)

APPLIED FOR IN 1921

Published January 12, 1922

1,193. S. ROTHMÜLLER. Radiators for aircraft engines. (157,283.)

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